

WHAT IS CLAIMED IS:

1. A method of furnishing a location service comprising:

transmitting a specific signal pattern at given intervals from at least three base stations, which allows a mobile terminal or station that received said signal pattern to locate itself by using positional information about said base stations, sending timing (or information on phase shift from the reference time) of each said signal pattern from said base stations, and signal pattern receiving time information;

making change to the sending timing of said signal pattern from at least one of said base stations; and

notifying said mobile terminal or station of the altered reference time offset (or information on phase shift from the reference time) of said sending timing or updated sending timing of said signal pattern on the occasion of said change.

2. The method of furnishing a location service according to claim 1, wherein in response to a request issued from said mobile terminal or station to at least one of said base stations, the notification of said altered reference time offset or updated sending timing of said signal pattern is sent to said mobile terminal or station.

00781137 021304

3. The method of furnishing a location service according to claim 2, wherein after receiving information to identify said mobile terminal or station together with said request and verifying the identification of said mobile terminal or station, the notification of said altered reference time offset or updated sending timing of said signal pattern is sent to said mobile terminal or station.

4. The method of furnishing a location service according to claim 2, wherein charging data for said mobile terminal or station is updated in response to said request.

5. The method of furnishing a location service according to claim 1, wherein said mobile terminal or station is furnished with a decrypting key and said base stations which are at least three each encrypt said altered reference time offset or updated sending timing of each said signal pattern transmitted from them and broadcast such encrypted information over their broadcast channel or control channel.

6. The method of furnishing a location service according to claim 1, wherein the timing of sending said

09781187 021301

signal pattern from at least one of said base stations is changed regularly.

7. The method of furnishing a location service according to claim 1, wherein said base stations which are at least three each broadcast the positional information about their own and neighboring base stations over their broadcast channel or control channel or sends such information to said mobile terminal or station in response to said request therefrom.

8. The method of furnishing a location service according to claim 3, wherein said mobile terminal or station is notified of said altered reference time offset or updated sending timing of said signal pattern on one of different precision levels, according to the agreement that its owner concluded with the administrator of said base stations.

9. The method of furnishing a location service according to claim 2, wherein if said request is issued from said mobile terminal or station while the sending timing of said signal pattern is changed, a message that location is not possible is sent to said mobile terminal or station.

09781187 031301

10. A method of furnishing a location service, comprising:

making change to the sending timing of a specific signal pattern of radio waves transmitted at given intervals from a base station regularly; and

notifying a specific mobile terminal or station of the altered reference time offset of said sending timing or updated sending timing of said signal pattern.

11. The method of furnishing a location service according to claim 10, wherein the identification of said mobile terminal or station is verified and said mobile terminal or station is notified of the altered reference time offset of said sending timing or updated sending timing of said signal pattern.

12. The method of furnishing a location service according to claim 11, wherein said mobile terminal or station is notified of said altered reference time offset or updated sending timing of said signal pattern on one of different precision levels, according to the agreement that its owner concluded with the administrator of at least three base stations including said base station.

09781187.021301

13. The method of furnishing a location service according to claim 11, wherein the charging data for said mobile terminal or station is updated when the identification of said mobile terminal or station is verified.

14. The method of furnishing a location service according to claim 10, wherein said mobile terminal or station is furnished with a decrypting key and said base station encrypts said altered reference time offset or updated sending timing of said signal pattern transmitted from it and broadcasts such encrypted information over its broadcast channel or control channel.

15. A method of furnishing a location service comprising:

making change to the sending timing of a specific signal pattern of radio waves transmitted at given intervals from a base station regularly or at irregular intervals;

calculating the location of a mobile terminal or station, based on the data on receiving timing of said signal pattern at said mobile terminal or station; and

notifying said mobile terminal or station of the result of calculation.

0070157 021301

16. The method of furnishing a location service according to claim 15, wherein the identification of said mobile terminal or station is verified and the location of said mobile terminal or station is calculated.

17. The method of furnishing a location service according to claim 16, wherein said mobile terminal or station is notified of the result of calculation of its location on one of different precision levels, according to the agreement that its owner concluded with the administrator of said base station.

18. The method of furnishing a location service according to claim 16, wherein the charging data for said mobile terminal or station is updated when the identification of said mobile terminal or station is verified.

~~19.~~ A method of location whereby:

a mobile terminal or station to locate itself sends its ID and a request for the information on the sending timing of a specific signal pattern transmitted at given intervals from base stations in its vicinity to a base station in the zone where it stays; and

09781187 "021301

said mobile terminal or station locates itself by using the answer from said base station in the zone where it stays and the information on receiving timing of each said signal pattern from said base stations in its vicinity.

20. A method of location whereby:

a mobile terminal or station to locate itself is furnished with a decrypting key and decrypts the encrypted information on the sending timing of a specific signal pattern transmitted at given intervals from base stations in its vicinity, which is broadcasted from a base station in the zone where it stays; and

said mobile terminal or station locates itself by using the thus decrypted information and the information on receiving timing of each said signal pattern from said base stations in its vicinity.

21. The method of location according to claim 19, wherein said mobile terminal or station receives the positional information about the base stations in its vicinity over the broadcast channel or control channel from the base station in the zone where it stays.

22. A location system comprising at least three base stations and one mobile terminal or station, wherein:

09704137 021304

said base stations transmit a specific signal pattern at given intervals;

at least one of said base stations changes the sending timing of said signal pattern; and

said mobile terminal or station locates itself by using the altered reference time offset or updated sending timing of said signal pattern, the positional information about said base stations, and the information on receiving timing of each said signal pattern from said base stations.

23. A location system comprising at least three base stations and one mobile terminal or station, wherein:

said base stations transmit a specific signal pattern at given intervals;

at least one of said base stations changes the sending timing of said signal pattern;

said base stations broadcast encrypted information on sending timing of each said signal pattern transmitted from their own and neighboring base stations over their broadcast channel or control channel; and

said mobile terminal or station decrypts the encrypted information on sending timing of each said signal pattern transmitted from base stations in its vicinity, broadcasted from a base station in the zone where it stays, by using a decrypting key, and locates itself by using the

09781187.021301

decrypted information, the positional information about said base stations, and the information on receiving timing of each said signal pattern from said base stations.

24. The location system according to claim 22 further comprising a server for storing the information on sending timing of each signal pattern transmitted from said base stations.

25. The location system according to claim 24, wherein said server instructs said base stations to change the sending timing of signal pattern.

~~26.~~ A location system comprising at least three base stations and one mobile terminal or station, wherein:

said base stations transmit a specific signal pattern at given intervals;

at least one of said base stations changes the sending timing of said signal pattern;

said mobile terminal or station notifies a base station in the zone where it stays of the information on receiving timing of each said signal pattern transmitted from said base stations;

a base station in the zone where said mobile terminal or station stays or a server to which the base

09781187 021304

station connected calculates the location of said mobile terminal or station; and

the base station in the zone where said mobile terminal or station stays notifies said mobile terminal or station of the result of calculation.

27. The location system according to claim 26, wherein said server stores the information on sending timing of each said signal pattern transmitted from said base stations.

28. The location system according to claim 27, wherein said server instructs said base stations to change the sending timing of said signal pattern.

~~29.~~ A base station comprising:

a specific signal generator that generates a specific signal pattern which is transmitted at given intervals from said base station;

a timing change unit that changes the sending timing of said signal pattern;

a generator of sending timing information that generates changed sending timing information; and

a transmitting unit that transmits said signal pattern and said sending timing information.

09784187 021301

30. The base station according to claim 29, further comprising:

a receive unit that receives ID from a mobile terminal or station; and

a decision unit that judges whether said ID matches the registered one,

wherein said transmitting unit transmits said signal pattern, according to the judgment of said decision unit.

31. A base station comprising:

a specific signal generator that generates a specific signal pattern which is transmitted at given intervals from said base station;

a timing change unit that changes the sending timing of said signal pattern;

a sending timing information encryptor that encrypts changed sending timing information; and

a transmitting unit that transmits said signal pattern and the encrypted sending timing information.

32. A base station comprising:

09781187.021301

a specific signal generator that generates a specific signal pattern which is transmitted at given intervals from said base station;

a timing change unit that changes the sending timing of said signal pattern as instructed by a server;

a forwarding unit that forwards the information on a mobile terminal's or station's receiving timing of each signal pattern transmitted from at least three base stations to the server; and

a transmitting unit that transmits said signal pattern and delivers the result of calculating the location of said mobile terminal or station received from said server to said mobile terminal or station.

33. A server to which at least three base station connect including:

a storage means for storing the information on sending timing of a specific signal pattern transmitted at given intervals from said base stations.

34. The server according to claim 33, further including:

a generator of instruction to change sending time for controlling the sending timing of each signal pattern from the said base stations; and

09781187.021301

a transmitting unit that transmits the instruction to change the sending timing to the above base stations.

35. The server according to claim 33, further including:

a calculating unit that calculates the location of said mobile terminal or station by using the information on the mobile terminal's or station's receiving timing of signal pattern, which the server received via one of the above base stations, sending timing of each signal pattern from the base stations, and the positional information about the base stations.

36. A mobile terminal or station to locate itself comprising:

a receive circuit that receives the information on sending timing of a specific signal pattern that at least three base stations are transmitting at given intervals from any one of said base stations;

a memory that retains the positional information about said base stations;

a circuit to measure receiving time that measures the receiving timing of each signal pattern transmitted from the above base stations; and

09781187 021301

a calculate circuit that calculates the location of the mobile terminal or station by using the above information on sending timing, the positional information about the above base stations, and the information on timing of receiving each signal pattern from the above base stations.

37. A mobile terminal or station to locate itself comprising:

a receive circuit that receives the encrypted information on sending timing of a specific signal pattern that at least three base stations are transmitting at given intervals over the broadcast channel or control channel from any one of said base stations;

a decryptor that decrypts said encrypted information;

a memory that retains the positional information about said base stations;

a circuit to measure receiving time that measures the receiving timing of each signal pattern transmitted from the above base stations; and

a calculate circuit that calculates the location of the mobile terminal or station by using the above information on sending timing, the positional information about the above base stations, and the information on timing

09781187 021301

of receiving each signal pattern from the above base stations.

38. A method of supplying signal pattern sending timing information whereby:

a plurality of levels of location precision based on the information on sending timing of a specific signal pattern transmitted at given intervals from a base station are provided;

a level of location precision is predetermined by the agreement between the owner of a mobile terminal or station and the administrator of the base station and the mapping between this level and each mobile terminal or station is stored in a storage device; and

in response to the request from said mobile terminal or station, said mobile terminal or station is notified of said sending timing on a precision level predetermined by said agreement.

39. A method of supplying specific signal sending timing information whereby:

an decrypting key is installed into a mobile terminal or station;

09781187 021301

the sending timing of a specific signal pattern periodically transmitted from a base station is changed regularly or at irregular intervals; and

the information on said sending timing is encrypted and broadcasted.

40. The method of supplying signal pattern sending timing information according to claim 39, wherein:

a plurality of levels of location precision based on the information on said sending timing are provided;

each level of said information is encrypted and broadcasted;

a decrypting key for decrypting such information on a precision level predetermined by the agreement between the owner of the mobile terminal or station and the administrator of the base station is installed into said mobile terminal or station.

41. A method of supplying signal pattern sending timing information whereby:

a plurality of levels of location precision based on the information on sending timing of a specific signal pattern periodically transmitted from a base station are provided;

09781137 "021301
T00120 281260

a level of location precision is predetermined by the agreement between the owner of a mobile terminal or station and the administrator of the base station and the mapping between this level and each mobile terminal or station is stored in a storage device;

the location of said mobile terminal or station is calculated on the level of location precision predetermined by said agreement, based on the information on said mobile terminal's or station's receiving timing of said signal pattern;

said mobile terminal or station is notified of the result of calculation.

09781187 021301
T06T20 28T18260